

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A PROPOSED DIVISION OF THE PHYLUM ECHINO-
DERMATA.

BY AUSTIN HOBART CLARK.

Many attempts have been made to elucidate the interrelations between the various echinoderm classes, but none of the proposed arrangements have been able to stand the test of critical investigation. I have recently shown that addition to the ambulacral post-radial series of ossicles in the crinoids takes place by the interpolation of ossicles between the first two (the first two brachials of the free arm) and the radials ("interpolated division series"); each division series of two ossicles represents *four* ambulacral plates as found in the urchins; two fuse, forming an axillary, and one disappears, its proximal and distal articular faces being thereby projected upon each other, fusing, and producing the non-muscular articulations by which the components of division series of two ossicles (or of the two pairs in cases where the division series are of four ossicles) are united. The method of ambulacral increase is, therefore, similar in the crinoids and echinoids. In addition, the crinoids add segments monoserially at the extreme tip of their long and slender arms. It has been supposed that this increase was comparable to that of ophiuroids and asteroids, but in reality it is merely a distant analogy, for in the asteroids and ophiuroids the plates are added biserially at the end of the arm, but just proximal to a permanent terminal plate. The ossicles up to and including the second brachial of the undivided crinoid arm are strictly homologous to the entire ambulacral series in an urchin; the remainder of the free arm represents the auricles of the urchin. A critical comparison of the anatomy of urchins and crinoids shows them to be closely related, and very different in almost every way

from the ophiuroids and asteroids, which are also similarly closely related. The holothurians belong with the former group. Detailed anatomical evidence of this will shortly be published in the *American Naturalist*.

The following is proposed as the arrangement best showing the interrelations of the classes in the phylum Echinodermata in the light of the most recent knowledge:

PHYLUM ECHINODERMATA.

I. Sub-phylum ECHINODERMATA HETERORADIATA.

1. Class *Pelmatozoa*.
 - a. Sub-class Crinoidea.
 - b. Sub-class Cystoidea.
 - c. Sub-class Blastoidea.
2. Class *Echinoidea*.
3. Class *Holothuroidea* (*Bohadschoidea*).

II. Sub-phylum ECHINODERMATA ASTORADIATA.

1. Class *Ophiuroidea*.
2. Class *Asteroidea*.